

C/015/025 Incoming

J. E. STOVER & ASSOCIATES, INC.

2352 NORTH 7th SREET, UNIT B
GRAND JUNCTION, COLORADO 81501
PHONE: (970) 245-4101, FAX 242-7908

#3662
R

MINE ENGINEERING
MINE RECLAMATION

CIVIL ENGINEERING
CONST. MANAGEMENT

COPY

October 14, 2010

Utah Coal Regulatory Program
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Re: Castle Valley Mining LLC
Castle Valley Mines
NOV- 10068 Abatement
Permit No. C/015/0025

RECEIVED

OCT 19 2010

DIV. OF OIL, GAS & MINING

Dear Sirs:

On behalf of Castle Valley Mining, LLC, attached is an application for a permit change to comply with the abatement actions required by NOV-10068 issued on September 22, 2010.

The referenced notice of violation was written because the Operator failed to submit a permit change or receive Division approval prior to construction of a concrete apron at the end of diversion ditch D-8D, and construction of a valve box for the Culinary Water System. On behalf of Castle Valley Mining, LLC, attached are the revised documents:

As a general note, the 'Water Bar configuration' as described in Chapter-7, page 136 was never constructed. Page 136 details why the water bar was to be constructed but when Ditch D-8D was upgraded with a concrete lining (thus what spurred the NOV) it was discovered by the Operator that the water bar was never installed. In addition, per a phone conversation with Karl Housekeeper on October 12, he confirmed the current configuration consists of Ditch D-8D flowing into a Culvert (newly named Culvert C-14D) and that culvert flows into Sediment Pond B. Reference to the Water Bar has been removed from applicable Plates and permit pages.

Additionally, the location of the new valve box, used to house the controls for the Culinary Water System, was constructed on the north side of the primary shop road.

Changes on applicable permit pages and Plates are detailed on DOGM Form C2. Please feel free to call me if you have any questions.

Sincerely,



J. E. Stover, P.E.
Consulting Engineer

File in:

☐ Confidential

☐ Shelf

☒ Expandable

Date Folder *10/19/2010* *C/0150025*

See: *Incoming* For additional

COPY

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Castle Valley Mining LLCMine: Castle Valley Mines

Permit Number:

C/015/0025Title: NOV-10068 Abatement

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED

<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7-113, Updated Table 7-24 with new ditch data for Ditch D-8D
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7-119, Added new culvert C-14D
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7-136, Revised text regarding Ditch D-8D-Water Bar
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7-138 Water Bar Never Constructed, page will read 'Page Intentionally Left Blank'
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7G-51, Added Culvert C-14 Design Information, and updated Table with Culvert C-13D
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7G-52, Added SedCad as program used to size culvert
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7G-108, Added design information for Ditch D-8D, Remove text regarding Water Bar
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7G-129, Remove Water Bar design, replace SedCad design for Ditch D-8D (Concrete)
<input checked="" type="checkbox"/> Add	<input type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 7G-107A, Add design for new Culvert C-14D
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 5A-2, Added new Valve Box to Table 5A-1, Existing Structures
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 5A-10, Added Structure #29, Culinary Water System Valve Box with short description
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Plate 5-2B, Added Concrete Lining on Ditch D-8D, Removed Water Bar
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Plate 5-2C, Added Valve Box
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Plate 7-1C, Added Valve Box
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Plate 7-1B, Added C-14D, Concrete lined portion of D-8D. Removed Water Bar
<input type="checkbox"/> Add	<input type="checkbox"/> Replace	<input type="checkbox"/> Remove	Plate 7-3, Added C-14D, Removed Grouted inlet text
<input type="checkbox"/> Add	<input type="checkbox"/> Replace	<input type="checkbox"/> Remove	Plate 7-5, Added C-14D, Concrete Lining on D-8D, and Valve Box. Removed Water Bar
<input type="checkbox"/> Add	<input checked="" type="checkbox"/> Replace	<input type="checkbox"/> Remove	Page 8-12, included reclamation estimate for concrete apron and concrete valve box
<input type="checkbox"/> Add	<input type="checkbox"/> Replace	<input type="checkbox"/> Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

Received by Oil, Gas & Mining

RECEIVED**OCT 19 2010**

DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING

COPY

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: Castle Valley Mining LLC

Mine: Castle Valley Mines

Permit Number: C/015/0025

Title: NOV-10068 Abatement

Description, Include reason for application and timing required to implement:

Castle Valley Mining LLC purchased the mine from the bankruptcy court.

Instructions: If you answer yes to any of the first eight questions, this application may require Public Notice publication.

- | | |
|---|---|
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ <input type="checkbox"/> increase <input type="checkbox"/> decrease. |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 2. Is the application submitted as a result of a Division Order? DO# _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 4. Does the application include operations in hydrologic basins other than as currently approved? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 6. Does the application require or include public notice publication? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 7. Does the application require or include ownership, control, right-of-entry, or compliance information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 9. Is the application submitted as a result of a Violation? NOV # <u>10068</u> |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 10. Is the application submitted as a result of other laws or regulations or policies? |

Explain: _____

- | | |
|---|--|
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 11. Does the application affect the surface landowner or change the post mining land use? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2) |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 13. Does the application require or include collection and reporting of any baseline information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 15. Does the application require or include soil removal, storage or placement? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 16. Does the application require or include vegetation monitoring, removal or revegetation activities? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 17. Does the application require or include construction, modification, or removal of surface facilities? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 18. Does the application require or include water monitoring, sediment or drainage control measures? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 19. Does the application require or include certified designs, maps or calculation? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 20. Does the application require or include subsidence control or monitoring? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 21. Have reclamation costs for bonding been provided? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 23. Does the application affect permits issued by other agencies or permits issued to other entities? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 24. Does the application include confidential information and is it clearly marked and separated in the plan? |

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Corey Heaps Vice President 10-14-10 Corey Heaps
 Print Name Position Date Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 14th day of October, 2010

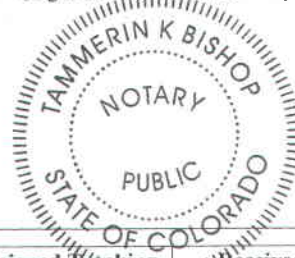
Notary Public: TAMMERIN K BISHOP, state of COLORADO

My commission Expires: 1/22/2011

Commission Number: N/A

Address: 1002 PRITCHARD MESA CT.

City: GRAND JCT. State: CO Zip: 81505



For Office Use Only:

Assigned Tracking Number:

Received by Oil, Gas & Mining

RECEIVED

OCT 19 2010

DIV. OF OIL, GAS & MINING

PUBLIC NOTICE

Castle Valley Mining, LLC, 2352 N. 7th Street Unit C, Grand Junction, CO, 81501, has submitted an application for a revision to the Division of Oil, Gas and Mining for its Bear Canyon Mine, mining permit No. C/015/0025. The proposed revision contains drainage calculations for a new concrete apron at the end of Ditch D-8D with updated hydrology and surface facilities maps. In addition, the proposed revision includes information relevant to a concrete valve box used to house the controls for the culinary water system and includes updated surface facilities maps noting the location of the concrete box.

The Bear Canyon Mine is located in Bear Canyon, approximately 12 road miles west of Huntington, Utah. The permit area, found on the USGS Hiawatha Quadrangle map, is described as follows:

- A. T16S, R7E SLBM Sec. 14: S1/2
 Sec. 23: E1/2, E1/2 W1/2
 Sec. 24: W1/2, W1/2 E1/2
 Sec. 25: NW1/4 NW1/4, E1/2 NW1/4, SW1/4 SW1/4,
 E1/2 SW1/4
 Sec. 26: NE1/4 NE1/4, NW1/4 NE1/4, N1/2 SW1/4
 NE1/4 and the access/haul road and topsoil
 storage area as shown on Plate 2-1 of the Bear Canyon
 Mining and Reclamation Plan
- T16S, R8E SLBM Sec. 7: NE1/4, NE1/4
 Sec. 8: NW1/4, W1/4 E1/2, N1/2 SW ¼, SE1/4 SW1/4
 Sec. 16: All
 Sec. 17: All
 Sec. 21: E1/2 NW1/4, NE1/4, N1/2 SE1/4
- B. T16S, R7E SLBM Sec. 1: Lots 1 and 2, S1/2 NE1/4, SE1/4
 Sec. 10: N1/2, N1/2 S1/2, SE1/4 SW1/4, S1/2 SE1/4
 Sec. 11: All
 Sec. 12: All
 Sec. 13: All
 Sec. 14: NE1/4, E1/2 NW1/4
 Sec. 24: E1/2, E1/2,
 Sec. 25: E1/2
- T16S, R8E SLBM Sec. 18: SW1/4, SW1/4
 Sec. 19: S1/2 NW1/4, SW1/4, SW1/4 SE1/4, N1/2 SE1/4,
 S1/2 NE1/4
 Sec. 20: S1/2 NW1/4, N1/2 SW1/4
 Sec. 30: W1/2, W1/2 NE1/4, NW1/4 SE1/4
- C. T16S, R7E SLBM Sec. 25: SW1/4 NW1/4, NW1/4 SW1/4
T16S, R8E SLBM Sec. 6: Lots 11-14, E1/2 SW1/4, W1/2 SE1/4, SE1/4 SE1/4

Sec. 7: all except NE1/4 NE1/4
Sec. 8: SW1/4, SW1/4
Sec. 18: N1/2, SE1/4, N1/2 SW1/4, SE1/4 SW1/4

D. T16S, R8E SLBM Sec. 31: NE1/4 NW1/4, NW1/4 NE1/4

E. T6S, R8E SLBM Sec. 19: Lot 1, NE1/4 NW1/4, N1/2 NE1/4
Sec. 20: N1/2 NW1/4, NE1/4, NE1/4, NE1/4
Sec. 21: W1/2 NW1/4, N1/2 SW1/2, SE1/4 SW1/4, S1/2SE1/4

Written comments regarding this application may be submitted to and additional information may be obtained from the Utah Division of Oil, Gas & Mining, P. O. Box 145801, Salt Lake City, Utah 84114-5801. Copies of the current mining plan are available for public inspection at the office of the Utah Division of Oil, Gas & Mining, Salt Lake City, and at the Emery County Recorder's Office, Energy County Courthouse, Castle Dale, Utah 84513.

EXISTING STRUCTURES

Table 5A-1 lists each structure and construction dates. Reclamation is expected in 2012

Table 5A-1 Existing Structures
Construction Dates

Existing Structure	Starting	Completion	Photo #
Sales/Receiving/Scale Office/Caretaker Dwelling	6/84	10/87	1
Fuel Tanks	10/83	6/84	2
Truck Loading Facility	9/82	4/83	3
Oil Slack Loading Facility	4/83	7/83	3
Storage & Stacking Facility	6/80	4/84	3
Conveyor Structures	3/80	6/80	3
Machine Shop	11/89	12/89	5
Shop	10/83	9/84	4
Coal Processing Facility	4/80	12/85	6
Lump Coal Facility	10/83	12/85	6
Non-Coal Storage Yard	3/80	9/84	7
WHR Tank Seam Fan	7/04/01	12/31/05	10
Powder Magazine	9/82	containerized	
Water Tanks & System	8/82	11/82	13
Lump Coal Storage Pad	8/92	10/92	15
Equipment Wash Pad	8/92	10/92	16
Shower House	5/93	7/94	17
Antifreeze Storage Tank	12/93	1/94	18
WHR Blind Canyon Seam Fan	7/4/01	12/31/05	19
Wild Horse Ridge Conveyor Belt	7/4/01	12/31/05	9
WHR Substation	7/4/01	12/31/05	12
WHR Fuel Tanks	7/4/01	12/31/05	14
WHR Coal Storage Bin	7/4/01	12/31/05	
Power Lines	7/4/01	12/31/05	
Water Lines	7/4/01	12/31/05	
Fuel Containment Enclosure	7/4/01	12/31/05	
Mine Portals	-	-	
CWS Valve Box	9/10	9/10	

regulations. The enclosure will be checked weekly and drained of standing water if needed. Details of the design, maintenance, and spill disposal can be found in the C.W. Mining SPCC plan.

28. Portals. The Bear Canyon #3 and #4 Mines, in Wild Horse Ridge, will have a total of six portals (Plate 3-4A and 3-4C), all located in Bear Canyon.

A Summary of the Portals are as follows:

	Existing
Blind Canyon Seam	3
Tank Seam -	<u>3</u>
Total	6

29. Culinary Water System Valve Box: An 8 ft. by 6 ft. concrete box constructed to enclose the control valves for the Culinary Water System. Location of the Box is shown on Plate 5-2C.

Table 7-24 Summary of Diversion Ditch Calculations

Ditch	Bottom Width (Ft)	Top Width (Ft)	Depth (Ft)	Type Side Slope H:V	Measured Slope %	Contributing Watershed	REQ'D Av. Rip-Rap Size (In.)
D-1D	0	1.33	0.67	1:1	2 Min 11 Max	AD-3A	Soil
D-2D	0	1.33	0.67	1:1	6 Min 20 Max	AD-3A, AD-5	Bedrock
D-3D						Replaced with C-5D	
D-4D	0	2	1	1:1	2Min 6Av. 17 Max	AD- 14	Soil Soil D ₅₀ = 6"
D-5D						Replaced with C-5D	
D-6D	0	3	1.5	1:1	2 Min 4 Max	AD-3A, AD-5 AD-7, AD-9, AD-10 AD-12, AD-14	Soil
D-7D	2	3.5	0.75	1.5:1	2 Min 6 Av. 55 Max	AD-1A, AD-1B, AD-2A AD-2B, AD-2C, AD-3B AD-4, AD-6, AD-8	Soil Soil D ₅₀ = 6"
D-8D	0	2	1	1:1	2 Min 7 Max	AD-13	Soil
<u>D-8D</u> Concrete	<u>1.5</u>	<u>2.5</u>	<u>0.5</u>	<u>1:1</u>	<u>2</u>	<u>AD-13</u>	<u>Soil</u>
D-8D Water Bar	<u>Water Bar Not Installed</u>						
D-9D	0	2	1	1:1	4 Min 10	AD-15	Soil
D-10D	1	3.33	0.67	1.5:1	7 Min 50	AD-6, AD-3B, (part) AD-2B, AD-2C	D ₅₀ = 4" Bedrock
D-11D	0	1	0.5	1:1	41 Min Near Vert.	Tipple Wash Hose	Grouted Rip-Rap
D-12D	0	1	0.5	1:1	81 Av.	Tipple Wash Hose	Soil
D-13D Water Shed	0	6	0.5	10:1 2:1	0.5 Av.	AD-6 Partial	Soil
D-14D	0	1.33	0.67	1.5:1	0.06Av.	AU-4A	Soil
D-15D	0	2.00	1.00	1:1	0.05 Av.	AD-16	Soil
D-16D	0	1.50	1.75	1:1	0.05 Av.	AD-18	Soil
D-17D	0	.96	1	1:1	0.08 Av.	AU-23, AD-20	Soil

Notes:

1. Dimensions given indicate minimum requirements. Actual dimensions may vary. Minimum required cross-sections will be maintained.
2. The use of lined drainage ditches is required when flow velocities exceed approximately 5 feet per second. Rip-rap may be installed where not required.

Table 7-25 Culvert Characteristics (Cont)

Culvert	Diameter (in.)	Type	Contributing Watersheds	Slope (ft/ft)	Outlet Condition
C-1D	15	CMP flexible	AD-6, AD-3B	1.00	24" rip-rap
C-2D	15	CMP, RCP flexible	AD-2B, AD-2C, AD 3B AD-4, AD-6	4.0	10" rip-rap
C-3D	20	slt pipe	AD-3A	0.03	4" rip-rap
C-4D	21	CMP	AD-3A, AD-5, AD-7, AD-14, C-10D	0.18	9" rip-rap
C-5D	18	CMP	AD-34, AD-5, AD-7, AD-9	0.07	3" rip-rap
C-6D	12	CMP	AD-b	0.48	9" rip-rap
C-7D	18	CMP	Abandoned In Place		
C-8D			Replaced with C-SD		
C-9D	18	CMP	See C-8D	0.05	3" rip-rap
C-10D	18	CMP	Tipple Wash Hose	0.03	Soil
C-11D	12	CMP flexible	AD-4A	0.05 0.25	3" rip-rap
C-12D	8	CMP	AD-18	0.05	Soil
C-13D	12	CMP	AU-23, AD-20	0.07	Soil
<u>C-14D</u>	<u>18</u>	<u>CMP</u>	<u>AD-13</u>	<u>.02</u>	<u>Soil</u>

coal storage pad, will be regraded to allow the drainage to flow into ditch D-7D below the fans shown on Plate 2-4C. At this point, the storage pad is level with D-7D, allowing drainage to easily flow into the ditch. The berm around the coal storage pad will prevent drainage over the edge of the pad and direct the flow toward ditch D-7D. The point at which the storage pad intersects D-7D is outside of the angle of repose of the coal pile, and the ditch will not be plugged by coal spillage. A catch basin exists just below this point which will trap any coal fines which may be washed into the drainage, protecting ditch D-7D below this point.

Ditch D-8D Water Bar

During October of 2010 as part of a response to NOV-10068, it was discovered that the Ditch D-8D water bar was never constructed, and therefore, references to it on applicable Plates and Permit text have been removed.

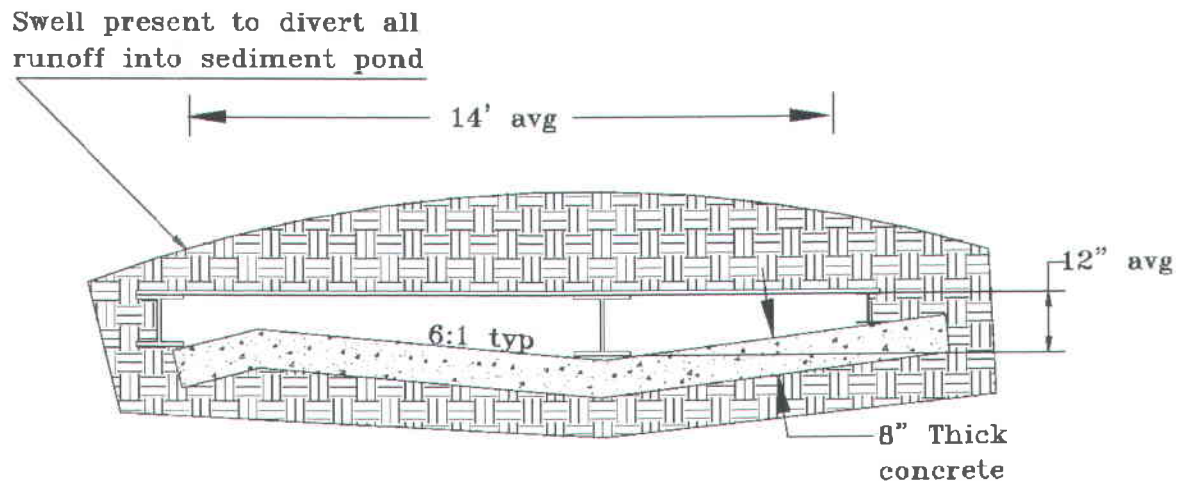
~~In 1996, Co-Op observed that erosion problems existed which were associated with the water bar conveying runoff from Ditch D-8D to the inlet of Sediment Pond "B" as a result of water associated with the Water Truck. In order to eliminate these problems, the water bar and associated channel will be grouted using an 8" concrete slab. This will prevent the channel from eroding. Figure 7-15 shows a typical cross-section of the concrete crossing. A steel bridge structure and swell provides vehicle crossing as shown in the figure. The bridge is designed so that the water bar design cross-section is maintained passing under it.~~

Culvert C-40U

A trash and a debris clean out basin will be placed at the entrance to culvert C-40U. Additionally while constructing the Tank Seam Portal C.W. Mining will investigate other methods that can be incorporated to reduce the possible culvert C-40U becoming plugged by debris.

Figure 7-15 Ditch D-8D Water Bar Concrete Structure*

*Water bar was never constructed.



Typical Cross-Section

Minimum Channel Depth = 0.67' Minimum Required Depth = 0.33'



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Culvert Characteristics (cont'd)

Culvert	Diameter (in.)	Type	Contributing Watersheds	Peak Q (cfs)	Slope (ft/ft)	Outlet Condition
C-1D	15	CMP flexible	AD-6, AD-3B	0.93	1.00	24" rip-rap
C-2D	15	CMP, RCP flexible	AD-2B, AD-2C, AD 3B AD-4, AD-6	1.47	4.0	10" rip-rap
C-3D	20	slt pipe	AD-3A	0.23	0.03	4" rip-rap
C-4D	21	CMP	AD-3A, AD-5, AD-7, AD-14, C-10D	2.66	0.18	9" rip-rap
C-5D	18	CMP	AD-34, AD-5, AD-7, AD-9	0.23	0.07	3" rip-rap
C-6D	12	CMP	AD-b	0.62	0.48	9" rip-rap
C-7D	18	CMP	Abandoned In Place			
C-8D			Replaced with C-5D			
C-9D	18	CMP	See C-8D	2.36	0.05	3" rip-rap
C-10D	18	CMP	Tipple Wash Hose	0.25	0.03	Soil
C-11D	12	CMP flexible	AD-4A	.35	0.05 0.25	3" rip-rap
C-12D	8	CMP	AD-18	0.55	0.05	Soil
<u>C-13D</u>	<u>12</u>	<u>CMP</u>	<u>AU-23, AD-20</u>	<u>0.99</u>	<u>0.07</u>	<u>Soil</u>
<u>C-14D</u>	<u>18</u>	<u>CMP</u>	<u>AD-13</u>	<u>1.23</u>	<u>.02</u>	<u>Soil</u>

All culverts were evaluated for adequacy using Flowmaster (Haestad Methods, Inc.) or SedCad

4. The flow to culverts were taken as the summation of flows from each contributing watershed (not accounting for flow routing). Thus, assumed flows are conservatively high.

Assume — $\eta = .024$ for CMP & flexible culverts

$\eta = .015$ for RCP & Steel pipe

Flowmaster and SedCad printouts are shown on the following pages.

All culverts are designed to pass the design flows without overtopping. Comparisons of outlet velocity with channel stability were made using the figure on page 53. The maximum permissible velocity corresponding to the appropriate channel slopes were used (1:1, 2:1 etc.).

Velocities of 5.0 ft/s and less were considered non-erosive.

Where riprap is to be placed at the culvert outlet, it should extend a minimum distance of 3D50 - 5D5 downstream from the culvert outlet. The required riprap for each culvert is shown in the tables on pg. 49-51.

Culvert C-14D

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (K _e)
50.00	2.00	0.0240	1.00	0.00	0.50

Culvert Results:

Minimum pipe diameter: 1 - 10 inch pipe(s) required

Culvert installed = 18" diameter

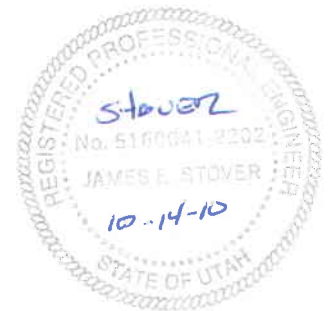
Detailed Performance Curves

Design Discharge = 1.23 cfs

Maximum Headwater = 1.00 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (8 in)	Discharge (cfs) (10 in)	Discharge (cfs) (12 in)
0.10	0.39	0.65	0.28
0.20	0.41	0.69	0.29
0.30	0.44	0.73	0.35
0.40	0.47	0.77	0.53
0.50	0.49	0.80	0.74
0.60	0.64	0.86	0.97
0.70	0.82	1.00	1.19
0.80	0.92	1.25	1.42
0.90	0.95	1.45	1.76
1.00	0.99	1.57	2.10
1.10	1.02	1.69	2.43
1.20	1.05	1.81	2.67
1.30	1.09	1.91	2.90
1.40	1.12	1.97	2.99
1.50	1.15	2.02	3.09



No Rip Rap Required

DITCH CHARACTERISTICS

DITCH	CHANNEL SLOPE %	CONTRIBUTING WATERSHED	PEAK Q(cfs)	BANK AND BOTTOM DESC.	MANNING 'S n ^(a)
D-1D	2 Min, 11 Max	AD-3A	0.23	Rocky Soil	0.03
D-2D	6 Min, 20 Max	AD-3A, AD-5	0.53	Rocky Soil, Bedrock	0.03
D-3D		Replaced with C-5D			
D-4D	2 Min, 7 Av 17 Max	AD-14	0.05	Soil	0.03
D-5D		Replaced with C-5D			
D-6D	2 Min, 4 Max	AD-3A, AD-5, AD-7 AD-9, AD-10, AD-12 AD-14	3.63	Rocky Soil	0.03
D-7D	2 Min, 6 Av 55 Max	AD-1A, AD-1B, AD- 2A AD-2B, AD-2C, AD-3B AD-4, AD-6, AD-8	4.90	Soil D ₅₀ = 3"	0.03 0.033
D-8D	2 Min, 7 Max	AD-13	1.23	Soil	0.03
<u>D-8D</u> Concrete	<u>2 Min</u>	<u>AD-13</u>	<u>1.23</u>	<u>Concrete</u>	<u>.015</u>
D-8D Water Bar	<u>Water Bar Not Installed</u>				
D-9D	4Min, 10 Max	AD-15	1.20	Soil	0.03
D-10D	7 Min, 50 Max	AD-6, AD-3B, AD-2C	1.03	D ₅₀ = 4"	0.033
D-11D	41 Min Near Vertical Max	TIPPLE WASH HOSE	0.25	Grouted rip-rap	0.035
D-12D	81 Av.	TIPPLE WASH HOSE	0.25	Grouted	0.03
D-13D Water Bar	0.5 Av.	AD-6 Partial	0.23	Soil	0.03
D-14D	0.06 Av.	AU-4A	0.35	Soil	0.03
D-15D	0.05 Av.	AD-16	1.24	Soil	0.03
D-16D	0.05 Av.	AD-18	0.55	Soil	0.03
D-17D	0.08	AU-23,AD-20	0.99		

Ditch D-8D (Concrete Lined)

Material: Concrete

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
1.50	1.0:1	1.0:1	2.0	0.0150	0.30		

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.23 cfs	
Depth:	0.18 ft	0.48 ft
Top Width:	1.86 ft	2.46 ft
Velocity:	3.99 fps	No rip-rap required
X-Section Area:	0.30 sq ft	
Hydraulic Radius:	0.151 ft	
Froude Number:	1.74	



Ditch D-8D Concrete Crossing Structure

Concrete Demolition

$$\text{Volume} = (35 \text{ ft}) (12 \text{ ft}) (0.67 \text{ ft}) = (281.4 \text{ cu ft}) / 27 = 10.4 \text{ cu yd}$$

$$\text{Cost} = (\$ 12.78/\text{cu yd}) (10.4 \text{ cu yd}) = \$ 133$$

$$\text{Time} = (10.4 \text{ cu yd}) / (45 \text{ cu yd/day}) = 0.23 \text{ days}$$

02220-875-5550 (Concrete Disposal on Site) 002315-400-1300 (3 CY loader) 02320-200-0320 (16 ton truck)

$$\text{Volume} = (10.4 \text{ cu yd}) (1.3 \text{ swell factor}) = 13.5 \text{ cu yd}$$

$$\text{Cost} = (\$ 10.69/\text{cu yd}) (13.5 \text{ cu yd}) = \$ 144$$

$$\text{Time} = (13.5 \text{ cu yd}) / (232 \text{ cu yd/day}) = 0.06 \text{ days}$$

Cost Subtotal \$ 277

Time Subtotal 0.29 days

Ditch D-8D Concrete Apron (installed 9/2010)

Concrete Demolition

$$\text{Volume} = (20 \text{ ft}) (4 \text{ ft}) (0.5 \text{ ft}) = (40 \text{ cu ft}) / 27 = 1.5 \text{ cu yd}$$

$$\text{Cost} = (\$ 12.78/\text{cu yd}) (1.5 \text{ cu yd}) = \$ 20$$

$$\text{Time} = (1.5 \text{ cu yd}) / (45 \text{ cu yd/day}) = 0.03 \text{ days}$$

02220-875-5550 (Concrete Disposal on Site) 002315-400-1300 (3 CY loader) 02320-200-0320 (16 ton truck)

$$\text{Volume} = (1.5 \text{ cu yd}) (1.3 \text{ swell factor}) = 2.0 \text{ cu yd}$$

$$\text{Cost} = (\$ 10.69/\text{cu yd}) (2.0 \text{ cu yd}) = \$ 21.4$$

$$\text{Time} = (2.0 \text{ cu yd}) / (232 \text{ cu yd/day}) = 0.009 \text{ days}$$

Cost Subtotal \$ 41.4

Time Subtotal .039 days

Ditch Flow Meter Box (installed 9/2010)

Concrete Demolition

$$\text{Volume Concrete Walls} = \{(8 \text{ ft}) (6.2 \text{ ft}) (.67 \text{ ft})\} * 4 = (133 \text{ cu ft}) / 27 = 4.9 \text{ cu yd}$$

$$\text{Volume Concrete Floor \& Ceiling} = \{(8.2)(6.2)(.67)\} * 2 = (68 \text{ cu ft}) / 27 = 2.5 \text{ cu yd}$$

Total Concrete Volume: 7.4 cu yd

$$\text{Cost} = (\$ 12.78/\text{cu yd}) (7.4 \text{ cu yd}) = \$ 95.2$$

$$\text{Time} = (7.4 \text{ cu yd}) / (45 \text{ cu yd/day}) = 0.16 \text{ days}$$

02220-875-5550 (Concrete Disposal on Site) 002315-400-1300 (3 CY loader) 02320-200-0320 (16 ton truck)

$$\text{Volume} = (7.4 \text{ cu yd}) (1.3 \text{ swell factor}) = 9.6 \text{ cu yd}$$

$$\text{Cost} = (\$ 10.69/\text{cu yd}) (9.6 \text{ cu yd}) = \$ 103$$

$$\text{Time} = (9.6 \text{ cu yd}) / (232 \text{ cu yd/day}) = 0.04 \text{ days}$$

Cost Subtotal \$ 198

Time Subtotal .2 days

Lump Coal Storage Pad

Concrete Demolition

$$\text{Wall Volume} = (38 \text{ ft}) (4 \text{ ft}) (1 \text{ ft}) + (80 \text{ ft}) (4 \text{ ft}) (1 \text{ ft}) = (472 \text{ cu ft}) / 27 = 17.5 \text{ cu yd}$$

$$\text{Slab Volume} = (38 \text{ ft}) (80 \text{ ft}) (0.67) = (2,027 \text{ cu ft}) / 27 = 75.1 \text{ cu yd}$$

$$\text{Total Volume} = 17.5 + 75.1 = 92.6 \text{ cu yd}$$

$$\text{Cost} = (\$ 12.78/\text{cu yd}) (92.6 \text{ cu yd}) = \$ 1,183$$

$$\text{Time} = (92.6 \text{ cu yd}) / (35 \text{ cu yd/day}) = 2.65 \text{ days}$$

02220-875-5550 (Concrete disposal on Site) 002315-400-1300 (3 CY loader) 02320-200-0320 (16 ton truck)

$$\text{Volume} = (92.6 \text{ cu yd}) (1.3 \text{ swell factor}) = 120.4 \text{ cu yd}$$

$$\text{Cost} = (\$ 10.69/\text{cu yd}) (120.4 \text{ cu yd}) = \$ 1,287$$

$$\text{Time} = (120.4 \text{ cu yd}) / (232 \text{ cu yd/day}) = 0.52 \text{ days}$$

Cost Subtotal \$ 2,470

Time Subtotal 3.17 days